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09/966,267	10/01/2001	Kiyoaki Murai	110750	4174

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EXAMINER	
BELL, PAUL A	

ART UNIT	PAPER NUMBER
2675	

DATE MAILED: 07/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/966,267	MURAI ET AL.	
	Examiner	Art Unit	
	PAUL A BELL	2675	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *6-17* is/are allowed.

6)☒ Claim(s) *1-5 and 18-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-5, and 18-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsushiro et al. (6,201,612).

With regard to claim 1 Matsushiro et al. teaches an image processing method, comprising: inputting data indicating a grayscale of **an individual** pixel (figure 5, "MULTI-LEVEL IMAGE" , into item 7); converting said input data into grayscale data which specifies a grayscale of an image output apparatus according to predetermined characteristics (figure 5, item 8, SELECTOR picks item 21 or item 11 based on predetermined characteristics SEE column 10 lines 3-27); and when said input data **of the individual pixel** corresponds to a specific grayscale value which causes a defect in an output of said image output apparatus (ABSTRACT and column 2, lines 17-18 also see column 10 lines 3-27) converting at least part of said input data **of the individual pixel** into grayscale data which specifies a grayscale value other than the specific grayscale value, and supplying the converted grayscale data **of the individual pixel** to said image output apparatus (figure 5, the selector picks item 21 (grayscale value other) or item 11 (specific grayscale value) then outputs BI-LEVEL IMAGE data, now see column 1, lines 17-18

"Multi-level images are often printed or displayed by bi-level output devices capable of expressing only two levels" , and also see column 1, lines 24-29 "among the known techniques for converting multi-level images to bi-level images are halftone patterns, dithering, error diffusion, and mean error minimization", and still further see column 2 , lines 10-16 "An object of the present invention is to provide an image processing apparatus, method, and computer program for converting a multi-level image to be a bi-level image, combining high processing speed with smooth expression of gray levels.").

With regard to claim 2. Matsushiro et al. teaches an image processing method according to claim 1, said converting further comprising a color reduction processing that reduces the number of levels which is indicatable by said input data into the number of levels which is indicatable by said grayscale data (column 1, lines 5-24).

With regard to claim 3 Matsushiro was shown above in claims 1 and 2 to teach most of the limitations and with further regard Matsushiro teaches the feature, " said color reduction processing being pseudo-halftone processing that distributes said grayscale data so that said grayscale data does not concentrate on the same value (Inherent feature of bi-level error diffusion to avoid concentrating on one value so as to prevent patterns forming).

With regard to claim 4 Matsushiro was shown above in claims 1 and 2 to teach most of the limitations and with further regard Matsushiro teaches the feature, "said color reduction processing converting all the input data corresponding to said specific grayscale value into grayscale data which specifies one of grayscale values adjacent to said specific grayscale value" (see column 2 , lines 10-16 "An object of the present invention is to provide an image processing apparatus, method, and computer program for converting a multi-level image to be a bi-level

image, combining high processing speed with **smooth** expression of gray levels." , and still even further the word "adjacent" is a broad concept whereby any grayscale value other than the specific grayscale value is inherently adjacent to it).

With regard to claim 5. Matsushiro et al. teaches an image processing method, comprising: inputting data **of an individual pixel** which indicates a grayscale of a pixel (figure 5, "MULTI-LEVEL IMAGE" , into item 7); and converting said input data **of the individual pixel** into grayscale data which specifies a grayscale of an image output apparatus by reducing the number of levels of said input data **of the individual pixel** according to predetermined characteristics(figure 5, item 8, SELECTOR column 1, lines 5-10); and by performing pseudo-halftone processing that displays a halftone, in which, when said input data **of the individual pixel** corresponds to a specific grayscale value which causes a defect in an output of said image output apparatus (ABSTRACT), at least part of said input data **of the individual pixel** is converted into grayscale data which specifies one of grayscale values adjacent to said specific grayscale value **of the individual pixel**, and supplying the converted data **of the individual pixel** to said image output apparatus (figure 5, the selector picks item 21 (grayscale value other) or item 11 (specific grayscale value) then outputs BI-LEVEL IMAGE data, now see column 1, lines 17-18 "Multi-level images are often printed or displayed by bi-level output devices capable of expressing only two levels" , and also see column 1, lines 24-29 "among the known techniques for converting multi-level images to bi-level images are halftone patterns, dithering, error diffusion, and mean error minimization", and still further see column 2 , lines 10-16 "An object of the present invention is to provide an image processing apparatus, method, and computer program for converting a multi-level image to be a bi-level image, combining high

processing speed with smooth expression of gray levels." , and still even further the word "adjacent" is a broad concept whereby any grayscale value other than the specific grayscale value is inherently adjacent to it).

With regard to claim 18 Matsushiro et al. teaches an image processing apparatus, comprising: a conversion circuit that converts **input** data indicating a grayscale of **of an individual pixel** into grayscale data which specifies a grayscale of an image output apparatus according to predetermined characteristics (figure 5), wherein, when said input data **of the individual pixel** corresponds to a specific grayscale value which causes a defect in an output of said image output apparatus (abstract), said conversion circuit converts at least part of said input data **of the individual pixel** into grayscale data which specifies a grayscale value other than the specific grayscale value, and supplies the converted grayscale data **of the individual pixel** to said image output apparatus (figure 5, the selector picks item 21 (grayscale value other) or item 11 (specific grayscale value) then outputs BI-LEVEL IMAGE data, now see column 1, lines 17-18 "Multi-level images are often printed or displayed by bi-level output devices capable of expressing only two levels" , and also see column 1, lines 24-29 "among the known techniques for converting multi-level images to bi-level images are halftone patterns, dithering, error diffusion, and mean error minimization", and still further see column 2 , lines 10-16 "An object of the present invention is to provide an image processing apparatus, method, and computer program for converting a multi-level image to be a bi-level image, combining high processing speed with smooth expression of gray levels.").

With regard to claim 19 Matsushiro et al. teaches an image processing apparatus, comprising: a conversion circuit that converts **input** data indicating a grayscale of **an individual**

pixel into grayscale data which specifies a grayscale of an image output apparatus by reducing the number of levels of said input data according to predetermined characteristics (figure 5), and by performing pseudo-halftone processing for displaying a halftone, wherein said conversion circuit converts at least part of the data **of the individual pixel** corresponding to a specific grayscale value which causes a defect in an output of said image output apparatus into grayscale data which specifies one of grayscale values adjacent to said specific grayscale value, and supplies the converted data **of the individual pixel** to said image output apparatus (figure 5, the selector picks item 21 or item 11 then output BI-LEVEL IMAGE). (figure 5, the selector picks item 21 (grayscale value other) or item 11 (specific grayscale value) then outputs BI-LEVEL IMAGE data, now see column 1, lines 17-18 "Multi-level images are often printed or displayed by bi-level output devices capable of expressing only two levels" , and also see column 1, lines 24-29 "among the known techniques for converting multi-level images to bi-level images are halftone patterns, dithering, error diffusion, and mean error minimization", and still further see column 2 , lines 10-16 "An object of the present invention is to provide an image processing apparatus, method, and computer program for converting a multi-level image to be a bi-level image, combining high processing speed with smooth expression of gray levels." and still even further the word "adjacent" is a broad concept whereby any grayscale value other than the specific grayscale value is inherently adjacent to it).

With regard to claim 20 Matsushiro et al. teaches an electronic device, comprising: an image processing apparatus and an image output apparatus (figure 5), said image processing apparatus converting **input** data indicating a grayscale of **an individual** pixel into grayscale data which specifies a grayscale of said image output apparatus by reducing the number of levels

of said input data according to predetermined characteristics and by performing pseudo-halftone processing for displaying a halftone (abstract, and column 1, lines 6-24), said image processing apparatus comprising a conversion circuit that converts at least part of the input data **of the individual pixel** corresponding to a specific grayscale value which causes a defect in an output of said image output apparatus (abstract) into the grayscale data which specifies one of grayscale values adjacent to said specific grayscale value, and said image forming apparatus outputting an image according to the grayscale data **of the individual pixel** converted by said image processing apparatus (figure 5, the selector picks item 21 or item 11 then output BI-LEVEL IMAGE). (figure 5, the selector picks item 21 (grayscale value other) or item 11 (specific grayscale value) then outputs BI-LEVEL IMAGE data, now see column 1, lines 17-18 "Multi-level images are often printed or displayed by bi-level output devices capable of expressing only two levels" , and also see column 1, lines 24-29 "among the known techniques for converting multi-level images to bi-level images are halftone patterns, dithering, error diffusion, and mean error minimization", and still further see column 2 , lines 10-16 "An object of the present invention is to provide an image processing apparatus, method, and computer program for converting a multi-level image to be a bi-level image, combining high processing speed with smooth expression of gray levels." and still even further the word "adjacent" is a broad concept whereby any grayscale value other than the specific grayscale value is inherently adjacent to it)

With regard to claim 21 Matsushiro et al. teaches an image processing program which causes a computer (column 2, lines 50-55) that supplies grayscale data which specifies a grayscale of an image output apparatus to said image output apparatus to function as device that indicates a grayscale of **an individual** pixel into said grayscale data by reducing the number of

levels of the input data according to predetermined characteristics and by performing pseudo-halftone processing for displaying a halftone (abstract, column 1, lines 1-25), wherein the device converts at least part of the data **of the individual pixel** corresponding to a specific grayscale value which causes a defect in an output of said image output apparatus into the grayscale data which specifies one of grayscale values adjacent to said specific grayscale value, and supplies the converted grayscale data **of the individual pixel** to said image output apparatus (figure 5, the selector picks item 21 or item 11 then output BI-LEVEL IMAGE). (figure 5, the selector picks item 21 (grayscale value other) or item 11 (specific grayscale value) then outputs BI-LEVEL IMAGE data, now see column 1, lines 17-18 "Multi-level images are often printed or displayed by bi-level output devices capable of expressing only two levels" , and also see column 1, lines 24-29 "among the known techniques for converting multi-level images to bi-level images are halftone patterns, dithering, error diffusion, and mean error minimization", and still further see column 2 , lines 10-16 "An object of the present invention is to provide an image processing apparatus, method, and computer program for converting a multi-level image to be a bi-level image, combining high processing speed with smooth expression of gray levels." and still even further the word "adjacent" is a broad concept whereby any grayscale value other than the specific grayscale value is inherently adjacent to it).

With regard to claim 22 Matsushiro et al. teaches (Amended) A computer-readable recording medium on which an image processing program is recorded (column 2, lines 50-55), said image processing program causing a computer for supplying grayscale data which specifies a grayscale of an image output apparatus to said image output apparatus to function as device that indicates a grayscale of **an individual** pixel into said grayscale data by reducing the number

of levels of the input data according to predetermined characteristics and by performing pseudo-halftone processing for displaying a halftone (column 1, lines 5-25), wherein the device converts at least part of the data **of the individual pixel** corresponding to a specific grayscale value which causes a defect in an output of said image output apparatus into the grayscale data which specifies one of grayscale values adjacent to said specific grayscale value, and supplies the scale data **of the individual pixel** to said image output apparatus (figure 5, the selector picks item 21 (grayscale value other) or item 11 (specific grayscale value) then outputs BI-LEVEL IMAGE data, now see column 1, lines 17-18 "Multi-level images are often printed or displayed by bi-level output devices capable of expressing only two levels" , and also see column 1, lines 24-29 "among the known techniques for converting multi-level images to bi-level images are halftone patterns, dithering, error diffusion, and mean error minimization", and still further see column 2 , lines 10-16 "An object of the present invention is to provide an image processing apparatus, method, and computer program for converting a multi-level image to be a bi-level image, combining high processing speed with smooth expression of gray levels." and still even further the word "adjacent" is a broad concept whereby any grayscale value other than the specific grayscale value is inherently adjacent to it).

Allowable Subject Matter

3. Claims 6-17 are allowed.

4. The following is a statement of reasons for the indication of allowable subject matter: with regard to claims 6-17 none of the prior art made of record teach or suggest the feature identified below for each independent claim in combination with all the other limitations of the claim.

With regard to claim 6 the feature, "and outputting the data subjected to said first pseudo-halftone processing as the grayscale data when a result of said determination step is no, and of further performing second pseudo-halftone processing on the data subjected to said first pseudo-halftone processing when a result of said determination step is yes so as to convert the data into the grayscale data which specifies one of the grayscale values adjacent to said specific grayscale value".

With regard to claim 7 the feature, "and outputting the data subjected to said first pseudo-halftone processing as the grayscale data while allowing an output of said specific grayscale value when a result of said determination step is no, and of further performing second pseudo-halftone processing on the data subjected to said first pseudo-halftone processing when a result of said determination step is yes so as to convert the data into the grayscale data which specifies one of the grayscale values adjacent to said specific grayscale value".

With regard to claim 8 the feature, " determining whether said input data is contained in a range which is to be converted into said specific grayscale value after performing first pseudo-halftone processing; and performing said first pseudo-halftone processing on said input data when a result of said determination step is no so as to convert the data into the grayscale data, and of performing second pseudo-halftone processing on said input data when a result of said determination step is yes so as to convert the data into the grayscale data which specifies one of the grayscale values adjacent to said specific grayscale value".

With regard to claim 9 the feature. "determining whether said input data is contained in part of a range which is to be converted into said specific grayscale value after performing first pseudo-halftone processing; and performing said first pseudo-halftone processing on said input

data when a result of said determination step is no so as to output the data as the grayscale data while allowing an output of said specific grayscale value, and of performing second pseudo-halftone processing on said input data when a result of said determination step is yes so as to convert the data into the grayscale data which specifies one of the grayscale values adjacent to said specific grayscale value".

With regard to claim 10 the feature, "converting said input data according to modified characteristics in such a manner that one of said characteristics out of a range corresponding to said specific grayscale value remains the same, and an inclination of said range is substantially halved, and the other characteristic out of said range maintains the continuity; performing pseudo-halftone processing on the data converted by the modified characteristics; and outputting the data, among the data subjected to said pseudo-halftone processing, smaller than said specific grayscale value as the grayscale data, and of shifting each grayscale value of the data greater than or equal to said specific grayscale value".

With regard to claim 11 the feature, "selecting a dither value according to coordinates of said pixel from a predetermined dither matrix for pseudo-halftone processing".

With regard to claim 13 the feature, "when a result of said determination is yes, adding a doubled value of said dither value and a value according to said color reduction to said input data so as to convert said input data into data which specifies one of grayscale values adjacent to said specific grayscale value according to the addition result".

With regard to claim 15 the feature "pre-processing compresses a range from a center value corresponding to one of grayscale values adjacent to a specific grayscale value which causes a defect in an output of said image output apparatus to a center value corresponding to the other adjacent grayscale value into a range from the center value corresponding to one of the grayscale values adjacent to said specific grayscale value to a center value corresponding to said specific grayscale value".

With regard to claim 16 the feature "pre-processing compresses a range from a center value corresponding to one of grayscale values adjacent to a specific grayscale value which causes a defect in an output of said image output apparatus to a center value corresponding to the other adjacent grayscale value into a range from the center value corresponding to one of the grayscale values adjacent to said specific grayscale value to a center value corresponding to said specific grayscale value".

With regard to claim 17 the feature, "pre-processing compresses a range from a center value corresponding to one of grayscale values adjacent to a specific grayscale value which causes a defect in an output of said image output apparatus to a center value corresponding to the other adjacent grayscale value into a range from the center value corresponding to one of the grayscale values adjacent to said specific grayscale value to a center value corresponding to said specific grayscale value".

Response to Arguments

5. Applicant's arguments filed 5/25/2004 have been fully considered but they are not persuasive.

The applicant argues on page 15 with regard to claims 1, 5, and 18-22 that Matsushiro fails to teach or disclose the feature, "converting the input data of **an individual pixel**, which corresponds to the specific grayscale value of **an individual pixel** which specifies a grayscale of an image output apparatus".

The examiner disagrees because the abstract states;

"Blocks containing abrupt changes in image content are preferably converted by **comparing each picture element individually** with a threshold value".

And further Column 4, lines 63-67 states;

"When bi-level quantization is employed, the indicated portions of the block errors of blocks 2,3,4, and 5 are added to **each individual pixel value** d(I,j) in block 6, and the modified **pixel values** are compared with respective thresholds to generate bi-level **pixel values**."

And still further column 5, lines 44-47 states;

The bi-level error diffusion processor 20 comprises a bi-level quantizer 21 that quantizes **each pixel** in the block **to a** bi-level **output value**"

COMMENTS

6. The examiner sees many similarities between Matsushiro reference and applicant's specification for example they both seem to deal with taking multi-level image data (3 or more levels) and converting by a processing means that avoid abrupt changes in image content to halftone data (bi-level data for example 2 levels) which the observer perceives as grayscale by spatial and time integration of the eye. It does appear based on applicants specification (not claims) that possibly applicants apparatus may also work directly with grayscale displays capable of 3 or more levels because his figure 7 illustrate 255 levels being converted to 7 levels.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul Bell whose telephone number is (703) 306-3019.

If attempts to reach the examiner by telephone are unsuccessful the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377 can help with any inquiry of a general nature or relating to the status of this application.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

Or Faxed to: (703) 872-9306

Or Hand-delivered to: Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Paul Bell
Art unit 2675
June 25, 2004

CHANH NGUYEN
PRIMARY EXAMINER